

REMARKS

Claims 1, 3, 5-11, and 19 have been amended and claims 38 and 39 have been added.

New claim 38 includes the limitation that the deposit comprises shale. This is supported in the numerous places in the application (e.g., p. 2, line 3). New claim 39 includes the limitation that the deposit comprises sodium bicarbonate. This is supported in the numerous places in the application (e.g., p. 1, "Field of the Invention.").

Rejections Under 35 U.S.C. § 103

Claims 1-6 and 8-37 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Rosar '790. Claim 1 has been amended to include the limitations that the solution is a liquid, that the solution is injected, and that the production solution has a temperature of at least 270°F. The Examiner argues that Rosar teaches a hot aqueous solution with a temperature of "about" 250°F. Applicants respectfully disagree and submit that the present claims define over Rosar. Rosar teaches an injection liquor temperature of below about 250°F, preferably in the range of 85-235°F (col. 9, lines 15-18). The temperature of the solution exiting the cavity is necessarily lower, particularly in light of the fact that the cavity temperature is maintained at approximately 190°F (col. 9, line 14). In particular, Rosar teaches that the temperature of the solution withdrawn from the cavity is in the range of about 80°F to 200°F (col. 5, lines 17-18). Thus, the temperature range of the production solution disclosed in Rosar is significantly below the temperature required in amended claim 1 and Rosar provides no suggestion to increase the temperature of the production solution above that recited in claim 1. Therefore, claims 1-6 and 8-37 are not obvious. Applicants request that this rejection be withdrawn.

Claims 1-37 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Rosar '790 in view of Beard '602. The Examiner argues that Beard teaches a solution at a temperature greater than 250°F to form hot aqueous solutions of

sodium bicarbonate. Applicants respectfully disagree. To render the claim obvious, the prior art must teach or suggest all claim limitations. As noted in the background section of the application:

Although U.S. Pat. No. 3,779,602 (assigned to Shell Oil Company) disclosed the possible use of low pressure steam at temperatures in excess of 250°F and preferably in excess of 300°F, published test reports indicate that the process was not successful. The Shell process, which was designed to recover oil as well as nahcolite, resulted in solids precipitation causing plugging and "flow impairment." (See, e.g., M. Prats et al. "Soluble Salt Processes for In-Situ Recovery of Hydrocarbons From Oil Shale," *Journal of Petroleum Technology*, 1078-88 (September, 1977).) The steam caused too much fracture of the oil shale formation and had too little water content to adequately dissolve the nahcolite. Moreover, the process was designed to decompose and recover hydrocarbons from the oil shale, impurities that would make it substantially more difficult and expensive to recover soda ash and/or bicarb from the well production. Accordingly, commercial solution mining of nahcolite has traditionally been conducted at ambient or slightly elevated temperatures. For these reasons, steam is not used in the present process.

As previously noted during the prosecution of a parent application (U.S. Patent 6,609,761), Beard does not teach solution mining with hot water of the requisite temperature. Beard teaches the use of low pressure steam. (See, e.g., Beard at col. 1, line 51; col. 2, line 57; col. 2, line 64; col. 4, line 49; col. 4, line 51; col. 5, line 18; col. 6, line 9; and col. 6, line 18.) As noted above, injection of steam causes too much fracture of the oil shale formation and has too little water content to adequately dissolve the nahcolite. Therefore, it would not contain sufficient latent heat and volume to form a production solution at 270°F as claimed. Beard does not teach the injection of water or other hot aqueous liquid

solution as claimed by Applicants in claim 1. Therefore, claim 1 and claims 2-37 dependent therefrom are not obvious.

Claims 1-37 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-26 of U.S. Patent No. 6,699,447 in view of Rosar '790 or Beard '602. Applicants respectfully disagree. As the Examiner notes, claims 1-26 of the '447 patent do not state the step of dissolving sodium bicarbonate in a mining zone in the deposit using by injecting a hot aqueous liquid solution to form a production solution having a temperature of at least 250°F. Additionally, as described above for claims 1-37, Rosar and Beard do not teach these limitations. The temperature range of the production solution disclosed in Rosar is significantly below the temperature required in amended claim 1. Beard teaches the injection of steam and does not teach the injection of water or other hot aqueous liquid solution as claimed by Applicants in claim 1. Therefore, claims 1-37 are patentably distinct and are not unpatentable by obviousness-type double patenting.

Claims 1-37 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-26 of U.S. Patent No. 6,699,447 in view of Ramey '809. Applicants respectfully disagree. Neither claims 1-26 of the '447 patent nor claims 1-33 of Ramey '809 teach the recycling at least a portion of the mother liquor to the mining zone to dissolve sodium bicarbonate, as required by claim 1. Therefore, claims 1-37 are patentably distinct and are not unpatentable by obviousness-type double patenting.

Claims 1-37 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-33 of U.S. Patent No. 6,854,809 in view of Neilsen '447. Applicants respectfully disagree. Neither claims 1-33 of Ramey '809 nor claims 1-26 of Neilsen '447 patent teach the recycling at least a portion of the mother liquor to the mining zone to dissolve sodium bicarbonate, as required by claim 1. Therefore, claims

1-37 are patentably distinct and are not unpatentable by obviousness-type double patenting.

SUMMARY

Applicants believe the present application is now in condition for allowance. If the Examiner has any remaining issues, he is invited to contact the undersigned attorneys for the Applicants via telephone if such communication would expedite this application.

Respectfully submitted,



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